

APPLICATION

5

FOR UNITED STATES LETTERS PATENT

10

SPECIFICATION

15

TO ALL WHOM IT MAY CONCERN:

20 BE IT KNOWN THAT I, **David G. Turner**, a citizen of the United States, have
invented a new and useful level system of which the following is a specification:

Level System

5 CROSS REFERENCE TO RELATED APPLICATIONS

Not applicable to this application.

10 STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable to this application.

15 BACKGROUND OF THE INVENTION

Field of the Invention

20 The present invention relates generally to levels and more specifically it relates to a level system for accurately and efficiently providing a levelness measurement.

25 Description of the Related Art

Levels have been in use for years for measuring plumb, level, 45 degrees and other angular measurements. One example of a well-known level is the vial level that includes box levels, I-beam levels, torpedo levels and the like. United States Patent No. 4,571,845 illustrates an exemplary bubble level within a ruler structure. The

present invention may be utilized within any of these types of level structures. The vial level is comprised of an elongate level housing with at least one straight surface and a bubble indicator positioned within level housing. The bubble indicator typically is comprised of a transparent elongate tubular vial structure that has a longitudinal axis
5 parallel, transverse, or angled with respect to the straight surface of the level housing. The vial structure is filled with a liquid and a bubble is positioned within the vial structure. A plurality of transverse indicia lines are within the vial structure to indicate levelness of the housing. The user positions the straight surface of the level housing against an object or structure to be measured for levelness. The bubble within the vial
10 structure moves to the highest portion of the vial structure and is generally centered when a desired angle (e.g. level, plumb, 45 degrees, etc.) is measured.

However, it can be difficult to accurately monitor the bubble within the vial structure. Conventional vial levels are typically not known for their accuracy and are
15 usually utilized in applications where accuracy is not a significant issue. In addition, in some lighting conditions it can be difficult to view the bubble within the liquid.

Various other levels have been recently created in an attempt to improve the accuracy of levels such as laser levels, electronic levels and the like. However, these
20 tools tend to be expensive to purchase and maintain.

Examples of patented devices which may be related to the present invention include U.S. Patent 4,914,823 to Harris; U.S. Patent 4,395,829 to Loftus; U.S. Patent 4,586,263 to Bratttain; U.S. Patent 6,133,996 to Plumb et al.; U.S. Patent 4,604,812 to
25 Arjomand; U.S. Patent 4,229,885 to Chiou; U.S. Patent 4,747,217 to Austin; U.S. Patent 6,032,376 to Shurtleff; U.S. Patent 4,843,725 to Harris; U.S. Patent 4,565,010 to Herman; U.S. Patent 5,074,509 to Van Orden; U.S. Patent 4,592,147 to Herman; U.S. Patent 4,026,034 to Stewart; and U.S. Patent 5,303,480 to Chek.

While these devices may be suitable for the particular purpose to which they address, they are not as suitable for accurately and efficiently providing a levelness measurement. Conventional levels are either not accurate or are expensive to utilize.

5

In these respects, the level system according to the present invention substantially departs from the conventional concepts and designs of the prior art, and in so doing provides an apparatus primarily developed for the purpose of accurately and efficiently providing a levelness measurement.

10

BRIEF SUMMARY OF THE INVENTION

In view of the foregoing disadvantages inherent in the known types of levels
5 now present in the prior art, the present invention provides a new level system
construction wherein the same can be utilized for accurately and efficiently providing a
levelness measurement.

The general purpose of the present invention, which will be described
10 subsequently in greater detail, is to provide a new level system that has many of the
advantages of the levels mentioned heretofore and many novel features that result in a
new level system which is not anticipated, rendered obvious, suggested, or even
implied by any of the prior art levels, either alone or in any combination thereof.

15 To attain this, the present invention generally comprises a container
positionable within a frame structure for retaining a volume of liquid, a upper
compartment within an upper portion of the container for retaining a buoyant member,
a first paddle and a second paddle pivotally attached within the container about the
buoyant member, and an indicator member attached to the paddles for indicating a
20 levelness or plumbness of a structure. As the buoyant member moves within the upper
compartment, the paddles move the indicator member accordingly.

There has thus been outlined, rather broadly, the more important features of the
invention in order that the detailed description thereof may be better understood, and
25 in order that the present contribution to the art may be better appreciated. There are
additional features of the invention that will be described hereinafter and that will form
the subject matter of the claims appended hereto.

In this respect, before explaining at least one embodiment of the invention in

detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of the description and should not be regarded as limiting.

A primary object of the present invention is to provide a level system that will overcome the shortcomings of the prior art devices.

A second object is to provide a level system for accurately and efficiently providing a levelness measurement.

Another object is to provide a level system that establishes a true level and plumb.

An additional object is to provide a level system that is easier to read than conventional bubble levels.

A further object is to provide a level system that does not require any batteries or calibration.

Another object is to provide a level system that may be utilized within various level structures.

Other objects and advantages of the present invention will become obvious to the reader and it is intended that these objects and advantages are within the scope of the present invention.

To the accomplishment of the above and related objects, this invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that changes may be made in the specific construction illustrated and described within the scope of the
5 appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Various other objects, features and attendant advantages of the present
5 invention will become fully appreciated as the same becomes better understood when
considered in conjunction with the accompanying drawings, in which like reference
characters designate the same or similar parts throughout the several views, and
wherein:

10 FIG. 1 is an upper perspective view of the present invention.

FIG. 2 is an upper perspective view of the present invention within a frame
structure.

15 FIG. 3 is a front view of the present invention illustrating a level indication of a
surface.

FIG. 4 is a front view of the present invention illustrating a surface having a
raised right portion.

20 FIG. 5 is a front view of the present invention illustrating a surface having a
raised left portion.

FIG. 6 is a side view of the present invention.

25

DETAILED DESCRIPTION OF THE INVENTION

A. Overview

5 Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, FIGS. 1 through 6 illustrate a level system 10, which comprises a container 20 positionable within a frame structure 12 for retaining a volume of liquid, a upper compartment 22 within an upper portion of the container 20 for retaining a buoyant member 30, a first paddle 60
10 and a second paddle 62 pivotally attached within the container 20 about the buoyant member 30, and an indicator member 50 attached to the paddles 60, 62 for indicating a levelness or plumbness of a structure. As the buoyant member 30 moves within the upper compartment 22, the paddles move the indicator member 50 accordingly.

B. Container

15 As best shown in Figure 1, a container 20 is provided capable of storing and containing a volume of liquid. The liquid may be comprised of various types of liquids commonly utilized within the bubble level industry. The liquid may be transparent, semi-transparent or colored.

20

The container 20 may have various shapes and structures other than illustrated in Figure 1 of the drawings. The container 20 is positionable within any frame structure 12 commonly utilized within the level industry such as but not limited to box, I-beam, ruler, and torpedo level structures. The container 20 may be positioned at
25 various angles within the frame structure 12 to provide various measurements such as level, plumb and a specific angle as shown in Figure 2 of the drawings.

Figure 1 illustrates the container 20 having an upper compartment 22 and a lower compartment. The lower compartment preferably is broader and has a fanned

structure to allow movement of the indicator member 50 in a pivoting manner. The lower compartment is preferably transparent or semi-transparent to allow for viewing of the indicator member 50 within.

5 The upper compartment 22 within the container 20 preferably has a straight ceiling that the buoyant member 30 is positionable against. The ceiling within the upper compartment 22 preferably has a curved cross sectional structure similar to conventional bubble vials for levels as best illustrated in Figures 1 and 6 of the drawings. Various other structures may be utilized to construct the upper compartment
10 22 as can be appreciated by one skilled in the art.

 The container 20 preferably includes a plurality of measurement indicia 28 which may be comprised of lines, numbers, or other symbolic structures. The measurement indicia 28 preferably include a center indicia 28 indicating level or
15 plumb. The center indicia 28 is preferably substantially transverse with respect to the longitudinal axis of the ceiling of the upper compartment 22.

C. Buoyant Member

 The buoyant member 30 is positionable within the upper compartment 22 as
20 best shown in Figures 1, 3, 4 and 5 of the drawings. The buoyant member 30 is comprised of any structure/material that is buoyant within the liquid within the container 20 such as but not limited to a gas bubble, a fluid, plastic member, cork, or other buoyant material/structure. The buoyant member 30 may have various shapes, sizes and configurations other than shown in the attached drawings.

25

D. Paddles

 A first paddle 60 is connected to a first arm 52 and a second paddle 62 is connected to a second arm 54 as shown in Figures 1 and 3 of the drawings. The first arm 52 and the second arm 54 are pivotally positioned within the container 20 thereby

supporting the first paddle **60** and the second paddle **62** in a pivotal manner within the container **20**.

The first arm **52** and the second arm **54** preferably form a V-shaped structure as best shown in Figures 1 and 3 of the drawings. The first paddle **60** and the second paddle **62** are positioned on opposing sides of the buoyant member **30** so that the buoyant member **30** manipulates the paddles **60**, **62** depending upon the position of the buoyant member **30**.

As shown in Figure 6 of the drawings, an axle **40** is positioned within the container **20** that pivotally supports the first arm **52** and the second arm **54**. The axle **40** may be pivotally positioned within the container **20** or the axle **40** may simply pivotally support the arms **52**, **54**. The axle **40** is preferably transverse with respect to the longitudinal axis of the upper compartment **22**.

E. Indicator Member

The indicator member **50** is attached to the paddles **60**, **62** and the arms **52**, **54**. The indicator member **50** is preferably comprised of an elongate needle like structure as shown in Figures 1 through 6 of the drawings, however the indicator member **50** may be comprised of various other mechanical structures pivotally positionable within the container **20**.

F. Diverters

As shown in Figures 1 and 3 of the drawings, a pair of lower diverters **24** are positioned within opposing sides of the container **20** for directing the buoyant member **30** between the paddles. In a situation where the buoyant member **30** has passed into the lower compartment and is attempting to return to the upper compartment **22** of the container **20**, the lower diverters **24** direct the buoyant member **30** toward a central location of the upper compartment **22** between the paddles **60**, **62**.

In addition, a pair of upper diverters 26 are within the container 20 that extend at an angle from the lower diverters 24 respectively as best shown in Figures 1 and 3 of the drawings. The lower diverters 24 and the upper diverters 26 form a V-shaped structure as further shown in Figure 3 of the drawings. The lower diverters 24 preferably extend past the upper diverters 26 and each contain a slot for receiving a portion of the paddles 60, 62 or arms 52, 54.

G. Operation

In use, the user positions a surface of the frame structure 12 retaining the present invention against a surface to be measured for levelness, plumbness or a specific angle. For example, Figure 3 illustrates a surface being measured that is level since the indicator member 50 is aligned with the center indicia 28 of the measurement indicia 28. However, if the surface is not level the buoyant member 30 will move towards the higher portion of the upper compartment 22 which in turn moves the indicator member 50 accordingly as shown in Figures 4 and 5 of the drawings. The user is thereby able to achieve an accurate measurement of the levelness, plumbness or angle of a surface by monitoring the position of the indicator member 50 instead of having to attempt to guess the location of a traditional bubble vial.

As to a further discussion of the manner of usage and operation of the present invention, the same should be apparent from the above description. Accordingly, no further discussion relating to the manner of usage and operation will be provided.

With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed to be within the expertise of those skilled in the art, and all equivalent

structural variations and relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

Therefore, the foregoing is considered as illustrative only of the principles of
5 the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

☐ **ENVIRONMENTAL ELEMENTS**

- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐

☐ **10. Level System**

- ☐ 11.
- ☐ 12. Frame Structure
- ☐ 13.
- ☐ 14.
- ☐ 15.
- ☐ 16.
- ☐ 17.
- ☐ 18.
- ☐ 19.

☐ **20. Container**

- ☐ 21.
- ☐ 22. Upper Compartment
- ☐ 23.
- ☐ 24. Lower Diverter
- ☐ 25.
- ☐ 26. Upper Diverter
- ☐ 27.
- ☐ 28. Measurement Indicia
- ☐ 29.

☐ **30. Buoyant Member**

- ☐ 31.
- ☐ 32.
- ☐ 33.
- ☐ 34.
- ☐ 35.
- ☐ 36.
- ☐ 37.
- ☐ 38.
- ☐ 39.

☐ **40. Axle**

- ☐ 41.
- ☐ 42.
- ☐ 43.
- ☐ 44.
- ☐ 45.
- ☐ 46.
- ☐ 47.
- ☐ 48.
- ☐ 49.

☐ **50. Indicator Member**

- ☐ 51.
- ☐ 52. First Arm
- ☐ 53.
- ☐ 54. Second Arm
- ☐ 55.
- ☐ 56.
- ☐ 57.
- ☐ 58.
- ☐ 59.

☐ **60. First Paddle**

- ☐ 61.
- ☐ 62. Second Paddle
- ☐ 63.
- ☐ 64.
- ☐ 65.
- ☐ 66.
- ☐ 67.
- ☐ 68.
- ☐ 69.

☐ **70.**

- ☐ 71.
- ☐ 72.
- ☐ 73.
- ☐ 74.
- ☐ 75.
- ☐ 76.
- ☐ 77.
- ☐ 78.
- ☐ 79.